

What's in a Cloud

from **Celebrating Chemistry**

Chemists Celebrate Earth Day



When you look up in the sky on most days, you are likely to see some kind of cloud. Think about the different appearances of clouds. Some are puffy, others are thin. Some look like a flat blanket across the sky, where others float along by themselves. In this article, you will read about the location and shape of clouds, and their chemical makeup. Also, you will read how clouds function as part of the water cycle.

Location and Shape

Clouds appear in different layers of the atmosphere and come in many sizes and shapes. There are three general categories of clouds: cirrus, cumulus, and stratus. These names come from the Latin words describing their shape: "wispy"/"curl of hair" (cirrus), "layer" (stratus), and "lump"/"heap" (cumulus).

Cirrus clouds are the clouds highest up in the sky. They appear "wispy" and thin. **Stratus** clouds are lowest in altitude, meaning they are closest to the ground. They tend to form a "layer" across the sky and when they are present we often say that the day is "overcast". **Cumulus** clouds usually have a flattened base and seem to grow upwards. These clouds tend to be "lumped" together in patches and can look like big puffs of cotton or a piece of cauliflower.

Chemical Makeup of Clouds

Did you know that you have something in common with clouds? Just like humans, clouds are mostly made of water. The location of the clouds in the atmosphere determines whether the water in the cloud is a solid (ice), liquid (water drops) or a gas (water vapor). For example, a cirrus cloud is made mostly of ice crystals. This is because cirrus clouds are high up in the atmosphere where the air is very cold.

Cumulus clouds are made of ice crystals and some water vapor. If you have ever seen steam rising from a hot pot on the stove, then you have seen water vapor.

Because cumulus clouds are in the middle layers of the atmosphere, the air is cold but not as cold as higher up. The water may form into ice crystals, or it may remain as water vapor. Because these clouds can contain water vapor, cumulus clouds are mostly associated with rain.

Stratus clouds are mostly made up of water droplets as they are closest to the ground where the air is generally the warmest.



stratus clouds



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Clouds and the Water Cycle

Did you know that there is the same amount of water on planet Earth today as there was millions of years ago? It's true, and it is all because of the water cycle.

Clouds function as one of three parts of the water cycle. Water can be found in one of three places: on land, in the air, or in the clouds. On land, water is found in places like oceans, lakes, rivers, and streams, to name a few. Water *evaporates* as water vapor and becomes part of the air. You have seen water vapor if you have watched steam rise from a hot pot or seen your breath on a cold morning.

Once it is part of the air, the water vapor is pulled upward where the air is cooler. In the cool air, the water vapor forms tiny water droplets which we see as clouds. Clouds become very full of water droplets, and eventually "empty" themselves in the form of *precipitation* (i.e.: rain, snow). The cycle of water moving from one place to the other (land, air and clouds) has continued for millions of years, and is happening right now.

The next time you go outside, look up in the sky and try to identify the types of clouds you see. Can you determine how the clouds formed? What form of water is likely to be in those clouds?

Using Chemistry to Make Rain

Have you ever heard of "cloud seeding?" Scientists have actually figured out a way to make it rain, using a chemical called silver iodide (or dry ice). A scientist in an airplane can spray a specific amount of silver iodide onto an existing cloud. The chemical freezes the water that is in the cloud, where it becomes too heavy to stay in the cloud. Therefore, the water must come out...in the form of rain!



cumulus clouds

